

T06D04 – The Pink Catalyst Demo Explanation

Oxidation of potassium sodium tartrate by hydrogen peroxide solution to give a mixture of oxygen and carbon dioxide gases

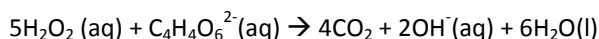
- Reaction is catalyzed by CoCl_2
- As the experiment proceeds the pink color of the aqueous Co^{2+} ions changes to green Co^{3+} (intermediate), before returning to pink indicating a regeneration of the catalyst.

The green activated complex can be trapped if a sample of the green solution is withdrawn with a dropping pipet and then transferred to a test-tube that is cooled in crushed ice. The solution remains green for some time (you could use spectroVis for fun).

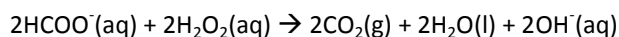
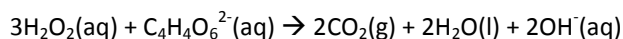
If the reaction is considered to be going too fast for observation, carry it out at lower temperature (although this will make it less easy to see the evolution of CO_2 before adding the catalyst).

Theory:

The basic reaction appears to be:



This equation may also be written in two parts:



The reaction is catalysed by pink Co^{2+} ions which are first oxidized to green Co^{3+} ions (complexed by tartrate ions) and then reduced back to Co^{2+} .

While the majority of gas evolved is CO_2 , O_2 will also be produced from the decomposition of some of the H_2O_2 . The gas mixture will turn limewater milky, but does not extinguish a glowing splint.

Extension:

Cobalt (II) bromide also catalyzes the reaction and students could be asked to try another cobalt salt. The reaction is easy to time and could form the basis of an investigation (design lab) into the factors affecting reaction rates.

